

Appendices.

At Air Liquide, safety is our top priority. Our customer service professionals are highly trained to serve you better.



CHARACTERISTICS OF PURE GASES

| Name of Gas | Chemical Formula | Molecular Weight | Specific Gravity (air=1) | Specific Volume | | Critical Pressure | | Critical Temperature | | Toxicity (TLV) |
|----------------------|--------------------------------|------------------|--------------------------|-----------------|----------|-------------------|--------|----------------------|-------|-------------------|
| | | | | cu. Ft/lb | cu. M/kg | psia | bar | F | C | |
| Acetylene | C ₂ H ₂ | 26.038 | 0.91 | 14.7 | 0.91 | 905.5 | 62.45 | 97.3 | 36 | Simple Asphyxiant |
| Air | - | 28.975 | 1 | 13.33 | 0.82 | 546.8 | 37.71 | -221.1 | -141 | - |
| Allene | C ₃ H ₄ | 40.065 | 1.411 | 9.6 | 0.6 | 792 | 54.62 | 248 | 120 | None Established |
| Ammonia | NH ₃ | 17.03 | 0.597 | 22.6 | 1.4 | 1639 | 113.03 | 270 | 132 | 25 ppm |
| Argon | Ar | 39.95 | 1.38 | 9.7 | 0.6 | 705.6 | 48.66 | -188 | -123 | Simple Asphyxiant |
| Arsine | AsH ₃ | 77.95 | 2.695 | 5 | 0.31 | 957 | 66 | 211.8 | 100 | 0.05 ppm |
| Boron Trichloride | BCl ₃ | 117.17 | 4.05 | 3.3 | 0.2 | 561.5 | 38.72 | 353.8 | 179 | None Established |
| Boron 11 Trifluoride | BF ₃ | 67.81 | 2.37 | 5.6 | 0.16 | 723.2 | 49.88 | 9.95 | -12 | Ceiling of 1 ppm |
| Boron Trifluoride | BF ₃ | 67.81 | 2.37 | 5.6 | 0.16 | 723.2 | 49.88 | 9.95 | -12 | Ceiling of 1 ppm |
| Bromine Trifluoride | BrF ₃ | 136.9 | 4.727 | - | - | - | - | - | - | None Established |
| 1,3 Butadiene | C ₄ H ₆ | 54.092 | 1.898 | 6.9 | 0.43 | 627.69 | 42.7 | 305.6 | 152 | 2 ppm |
| n-Butane | C ₄ H ₁₀ | 58.12 | 2.076 | 6.4 | 0.4 | 550.8 | 37.99 | 305.6 | 152 | 800 ppm |
| 1-Butene | C ₄ H ₈ | 56.11 | 1.998 | 6.7 | 0.42 | 585.1 | 40.35 | 295.5 | 146 | None Established |
| cis-2-Butene | C ₄ H ₈ | 56.11 | 1.997 | 6.7 | 0.42 | 609.9 | 42.05 | 324 | 155 | None Established |
| trans-2-Butene | C ₄ H ₈ | 56.11 | 1.997 | 6.7 | 0.42 | 595.2 | 41.57 | 311 | 155 | None Established |
| Carbon Dioxide | CO ₂ | 44.01 | 1.521 | 8.76 | 0.55 | 1071.6 | 73.9 | 87.8 | 31 | 5000 ppm |
| Carbon Monoxide | CO | 28.01 | 0.968 | 13.8 | 0.86 | 507.6 | 35.01 | -220.4 | -140 | 25 ppm |
| Carbonyl Sulfide | COS | 60.075 | 2.1 | 6.5 | 0.4 | 896.7 | 61.84 | 221 | 105 | None Established |
| Chlorine | Cl ₂ | 70.91 | 2.49 | 5.4 | 0.33 | 1118.7 | 77.15 | 291.2 | 144 | 0.5 ppm |
| Chlorine Trifluoride | ClF ₃ | 92.45 | 3.14 | 4.2 | 0.262 | 837.9 | 57.79 | 345.2 | 209.2 | 0.1 M ppm |
| Cyanogen | CNCN | 52.036 | 1.806 | 7.4 | 0.46 | 855.5 | 59 | 259.8 | 127 | 10 ppm |
| Cyanogen Chloride | CNCl | 61.47 | 1.98 | 6.3 | 0.393 | 868.8 | 59.92 | 347.6 | 175 | 0.3 ppm Ceiling |
| Cyclopropane | C ₃ H ₆ | 42.08 | 1.45 | 9.2 | 0.574 | 796.7 | 54.2 | 255.9 | 124.4 | None Established |
| Deuterium | D ₂ | 4.032 | 0.139 | 95.9 | 5.95 | 241.55 | 16.66 | -390.6 | -235 | None Established |
| Diborane | B ₂ H ₆ | 27.67 | 0.95 | 13.98 | 0.88 | 581 | 39.5 | 62.1 | 16.7 | 0.1 ppm |

| Name of Gas | Chemical Formula | Molecular Weight | Specific Gravity (air=1) | Specific Volume | | Critical Pressure | | Critical Temperature | | Toxicity (TLV) |
|----------------------|---|------------------|--------------------------|-----------------|----------|-------------------|-------|----------------------|--------|-------------------|
| | | | | cu. Ft/lb | cu. M/kg | psia | bar | F | C | |
| Dichlorosilane | SiH ₂ Cl ₂ | 100.99 | 3.48 | 3.83 | 0.24 | 678.2 | 46.77 | 348.8 | 176 | None Established |
| Dimethylamine | (CH ₃) ₂ NH | 45.08 | 1.55 | 8.5 | 0.53 | 770.28 | 53.12 | 328.1 | 165 | 5 ppm |
| Dimethyl Ether | (CH ₃) ₂ O | 46.07 | 1.59 | 8.4 | 0.52 | 771.75 | 53.22 | 263.8 | 129 | None Established |
| 2,2-Dimethylpropane | C ₅ H ₁₂ | 72.15 | 2.622 | 5.3 | 0.331 | 464.5 | 31.6 | 321.1 | 160.6 | None Established |
| Disilane | Si ₂ H ₆ | 62.22 | - | - | - | 746.9 | 51.5 | 303.53 | 150.85 | None Established |
| Ethane | C ₂ H ₆ | 30.07 | 1.047 | 12.8 | 0.79 | 708 | 48.83 | 90.1 | 32 | Simple Asphyxiant |
| Ethylacetylene | C ₄ H ₆ | 54.09 | 1.966 | 7.2 | 0.45 | 683.4 | 47.13 | 374.9 | 191 | None Established |
| Ethyl Chlorine | C ₂ H ₅ Cl | 64.52 | 2.22 | 6 | 0.37 | 764.4 | 52.72 | 368.96 | 187 | 1000 ppm |
| Ethylene | C ₂ H ₄ | 28.054 | 0.974 | 13.8 | 0.86 | 742.35 | 51.2 | 49.82 | 10 | Simple Asphyxiant |
| Fluorine | Fl ₂ | 37.997 | 1.696 | 10.2 | 0.64 | 754.6 | 52.85 | -200.9 | -129.4 | 1 ppm |
| Germane | GeF ₄ | 76.62 | 3.43 | 5.05 | 0.315 | 805.3 | 55.54 | 94.7 | 34.8 | 0.2 ppm |
| Halocarbon 11 | CCl ₃ F | 137.7 | 5.04 | 2.993 | 0.186 | 635 | 43.8 | 388.4 | 198 | 1000 ppm Ceiling |
| Halocarbon 12 | CCl ₂ F ₂ | 120.91 | 4.2 | 3.1 | 0.19 | 596.9 | 41.17 | 233.6 | 112 | 1000 ppm |
| Halocarbon 13 | CClF ₃ | 104.46 | 3.8 | 3.5 | 0.22 | 561 | 38.69 | 83.9 | 29 | None Established |
| Halocarbon 13 B1 | CBrF ₃ | 178.91 | 5.3 | 2.6 | 0.16 | 574.8 | 39.64 | 152.6 | 67 | 1000 ppm |
| Halocarbon 14 | CF ₄ | 88 | 3.038 | 4.4 | 0.27 | 542.4 | 37.41 | -49.9 | -46 | None Established |
| Halocarbon 21 | CHCl ₂ F | 102.92 | 3.82 | 3.5 | 0.22 | 749.7 | 51.7 | 353.3 | 179 | 10 ppm |
| Halocarbon 22 | CHClF ₂ | 86.47 | 3.08 | 4.4 | 0.27 | 716 | 49.38 | 204.8 | 96 | 1000 ppm |
| Halocarbon 23 | CHF ₃ | 70.01 | 2.43 | 5.5 | 0.34 | 701.2 | 48.36 | 78.6 | 26 | None Established |
| Halocarbon 113 | CCl ₂ F-CIF ₂ | 187.38 | 2.39 | - | - | 495.4 | 34.17 | 417.4 | 214 | 1000 ppm |
| Halocarbon 114 | C ₂ Cl ₂ F ₄ | 170.93 | 5.93 | 2.3 | 0.14 | 474.8 | 32.74 | 294.3 | 146 | 1000 ppm |
| Halocarbon 115 | C ₂ ClF ₆ | 154.45 | 5.569 | 2.4 | 0.15 | 453 | 31.24 | 175.9 | 80 | 1000 ppm |
| Halocarbon 116 | C ₂ F ₆ | 138.01 | 4.773 | 2.8 | 0.17 | 432 | 30.2 | 67.5 | 24 | None Established |
| Halocarbon 142 B | CH ₃ CClF ₂ | 100.5 | 3.63 | 3.6 | 0.22 | 598.1 | 41.25 | 278.8 | 136 | None Established |
| Halocarbon 152 A | C ₂ H ₄ F ₂ | 66.05 | 2.36 | 5.85 | 0.365 | 652 | 45 | 236.3 | 114 | None Established |
| Halocarbon C-318 | C ₄ H ₈ | 200.3 | 7.33 | 1.9 | 0.12 | 402.8 | 27.78 | 239.5 | 115 | None Established |
| Halocarbon 1132 A | C ₂ H ₂ F ₂ | 64.04 | 2.2 | 6 | 0.37 | 646.8 | 44.6 | 85.5 | 30 | None Established |
| Helium | He | 4.003 | 0.138 | 96.7 | 6 | 33.22 | 2.29 | -450.2 | -268 | Simple Asphyxiant |
| Hexafluoropropylene | C ₃ F ₆ | 150.03 | 1.583 | 2.58 | 0.156 | 420.3 | 29 | 201.1 | 94 | None Established |
| Hydrogen | H ₂ | 2.016 | 0.00696 | 192 | 11.9 | 188.2 | 12.98 | -400.4 | -240 | Simple Asphyxiant |
| Hydrogen Bromide | HBr | 80.92 | 2.7 | 4.8 | 0.3 | 1234.8 | 85.16 | 193.6 | 90 | 3 ppm Ceiling |
| Hydrogen Chloride | HCl | 36.46 | 1.268 | 10.9 | 0.68 | 1198 | 82.62 | 124.5 | 151 | 5 ppm Ceiling |
| Hydrogen Fluoride | HF | 20.01 | 1.27 | 17 | 1.05 | 941 | 64.9 | 370.4 | 188 | 3 ppm Ceiling |
| Hydrogen Selenide | H ₂ Se | 80.976 | 2 | 4.8 | 0.3 | 1294 | 89.24 | 280 | 138 | 0.05 ppm |
| Hydrogen Sulfide | H ₂ S | 34.08 | 1.189 | 11.2 | 0.69 | 1309 | 90.28 | 212.7 | 100 | 10 ppm |
| Iodine Pentafluoride | IF ₆ | 221.9 | 3.189 (liq.) | 1.7 | 0.11 | 621.8 | 42.88 | 541.4 | 283 | None Established |
| Isobutane | i-C ₄ H ₁₀ | 58.12 | 2 | 6.5 | 0.4 | 529.2 | 35.5 | 275 | 135 | None Established |

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|--|--|------------------|--------------------------|-----------------|-----------|-------------------|-------------|----------------------|----------|--------------------|
| | | | | cu. Ft/lb | cu. M/kg | psia | bar | F | C | |
| Isobutylene | C ₄ H ₈ | 56.11 | 1.997 | 6.7 | 0.42 | 579.2 | 39.94 | 292.5 | 145 | None Established |
| Krypton | Kr | 83.8 | 2.889 | 4.6 | 0.29 | 798.2 | 55.05 | -82.8 | -64 | Simple Asphyxiant |
| Methane | CH ₄ | 16.04 | 0.55 | 23.7 | 1.47 | 673.3 | 46.43 | -115.8 | -82 | Simple Asphyxiant |
| Methylacetylene | C ₃ H ₄ | 40.065 | 1.411 | 9.7 | 0.605 | 816.2 | 56.28 | 264.6 | 129.24 | 1000 ppm |
| Methyl Bromide | CH ₃ BR | 94.94 | 3.3 | 4.1 | 0.25 | 757 | 52.21 | 375.8 | 191 | 5ppm |
| 3-Methylbutene-1 | C ₅ H ₁₀ | 70.135 | 2.549 | 5.5 | 0.343 | 451.3 | 31.1 | 340.7 | 171.5 | None Established |
| Methyl Chloride | CH ₃ Cl | 50.49 | 1.74 | 7.6 | 0.47 | 968.7 | 66.81 | 289.6 | 143 | 50 ppm |
| Methyl Fluoride | CH ₃ F | 34.03 | 1.195 | 11.36 | 0.709 | 852 | 58.76 | 112.3 | 45 | None Established |
| Methyl Mercaptan | CH ₃ SH | 48.11 | 1.66 | 7.5 | 0.47 | 1049.6 | 72.39 | 386.2 | 197 | 0.5 ppm |
| Monoethylamine | C ₂ H ₅ NH ₂ | 45.08 | 1.56 | 7.9 | 0.49 | 816.44 | 56.31 | 361.77 | 183 | 10 ppm |
| Monomethylamine | CH ₃ NH ₂ | 31.058 | 1.07 | 12.1 | 0.755 | 1081.9 | 74.61 | 314.4 | 157 | 5 ppm |
| Neon | Ne | 20.18 | 0.696 | 19.2 | 1.19 | 394.84 | 27.23 | -379.7 | -229 | Simple Asphyxiant |
| Nitric Oxide | NO | 30.01 | 1.04 | 12.9 | 0.8 | 940.8 | 64.88 | -135.4 | -93 | 25 ppm |
| Nitrogen | N ₂ | 28.01 | 0.967 | 13.8 | 0.86 | 492.45 | 33.95 | -232.8 | -147 | Simple Asphyxiant |
| Nitrogen Dioxide or Nitrogen Tetroxide | NO ₂ or N ₂ O ₄ | 46.01 - | 1.58 - | 4.7 - | 0.29 - | 1470 - | 101.38 - | 316.4 - | 158 - | 3 ppm Ceiling - |
| Nitrogen Trifluoride | NF ₃ | 71 | 2.48 | 5.44 | 0.034 | 657.4 | 45.34 | -38.9 | -39.36 | 10 ppm |
| Nitrogen Trioxide | N ₂ O ₃ | 76.01 | - | 5.1 | 0.31 | - | - | - | - | None Established |
| Nitrous Oxide | N ₂ O | 44.01 | 1.53 | 8.7 | 0.54 | 1054 | 72.69 | 97.7 | 37 | 50 ppm |
| Oxygen | O ₂ | 32 | 1.105 | 12.1 | 0.755 | 731.6 | 50.43 | -181 | -118 | None Established |
| Perfluoropropane | C ₃ F ₈ | 188.02 | 6.683 | 2 | 0.12 | 388.8 | 26.82 | 161.4 | 72 | None Established |
| Phosgene | COCl ₂ | 98.92 | 3.4 | 3.9 | 0.24 | 823.2 | 56.77 | 359.4 | 182 | 0.1 ppm |
| Phosphine | PH ₃ | 34 | 1.184 | 11.4 | 0.71 | 948.15 | 65.39 | 124.34 | 51 | 0.3 ppm Ceiling |
| Propane | C ₃ H ₈ | 44.1 | 1.55 | 8.7 | 1.54 | 617.4 | 42.58 | 206.2 | 97 | Simple Asphyxiant |
| Propylene | C ₃ H ₆ | 42.08 | 1.476 | 9.1 | 0.58 | 667.4 | 46.03 | 197.4 | 92 | Simple Asphyxiant |
| Silane | SiH ₄ | 32.12 | 1.114 | 12.1 | 0.75 | 702.7 | 48.46 | 25.8 | -3.4 | 5 ppm |
| Silicon Tetrafluoride | SiF ₄ | 104.08 | 3.7 | 3.7 | 0.23 | 539.5 | 37.21 | 6.6 | -140 | None Established |
| Sulfur Dioxide | SO ₂ | 64.06 | 2.262 | 5.9 | 0.37 | 1143.6 | 78.87 | 315.5 | 158 | 2 ppm |
| Sulfur Hexafluoride | SF ₆ | 146.05 | 5.114 | 2.5 | 0.16 | 545.5 | 37.62 | 114 | 46 | 1000 ppm |
| Sulfur Tetrafluoride | SF ₄ | 108.06 | 3.53 | 3.7 | 0.23 | 920.2 | 63.46 | 195.8 | 91 | 0.1 ppm Ceiling |
| Tetrafluoroethylene | C ₂ F ₄ | 100.016 | 3.53 | 3.8 | 0.24 | 573 | 39.52 | 91.9 | 33.3 | None Established |
| Trimethylamine | (CH ₃) ₃ N | 59.11 | 2.087 | 6 | 0.37 | 591.8 | 41.33 | 320.18 | 160 | 5 ppm |
| Tungsten Hexafluoride | WF ₆ | 297.84 | 10.29 | 1.3 | 0.09 | 619.3 | 43.26 | 338 | 170 | None Established |
| Vinyl Chloride | C ₂ H ₃ Cl | 62.5 | 2.15 | 6.2 | 0.387 | 774.7 | 53.43 | 317.1 | 156.4 | 5 ppm |
| Xenon | Xe | 131.3 | 4.553 | 2.9 | 0.18 | 852.6 | 58.8 | 61.3 | 15.9 | Simple Asphyxiant |